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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/630,992	07/30/2003	Sheng Ma	YOR920030160US1	7734

7590   02/05/2007

Ryan, Mason & Lewis, LLP
90 Forest Avenue
Locust Valley, NY 11560

EXAMINER
CHANNAVAJJALA, SRIRAMA T

ART UNIT	PAPER NUMBER
2166	

MAIL DATE	DELIVERY MODE
02/05/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

		Application No.	Applicant(s)
Notice of Allowability		10/630,992	MA ET AL.
		Examiner	Art Unit
		Srirama Channavajjala	2166

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *12/27/06.*

2. ☐ The allowed claim(s) is/are *1,6-8,13-15,20 and 21 [re-numbered as: 1-9].*

3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a) ☐ All   b) ☐ Some*   c) ☐ None   of the:

        1. ☐ Certified copies of the priority documents have been received.

        2. ☐ Certified copies of the priority documents have been received in Application No. _____ .

        3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the
           International Bureau (PCT Rule 17.2(a)).

    * Certified copies not received: _____ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.

    (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached

        1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____ .

    (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of
        Paper No./Mail Date _____ .

    Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)

2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)

3. ☐ Information Disclosure Statements (PTO/SB/08),
    Paper No./Mail Date _____

4. ☐ Examiner's Comment Regarding Requirement for Deposit
    of Biological Material

5. ☐ Notice of Informal Patent Application

6. ☒ Interview Summary (PTO-413),
    Paper No./Mail Date *1/26/07* .

7. ☒ Examiner's Amendment/Comment

8. ☒ Examiner's Statement of Reasons for Allowance

9. ☐ Other _____ .

Srirama Channavajjala
Primary Examiner
Art Unit: 2166

DETAILED ACTION

1. Claims 1,6-8,13-15,20-21 are allowed.

2. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed on 27 December 2006 in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 29 November 2006 has been entered, Office action is as follows

3. Claims 1,8,15 have been amended [6/9/2006].

4. Claims 2,9,16 have been cancelled [6/9/2006].

Drawings

5. The Drawings filed on 9/15/2003 are <u>acceptable</u> for examination purpose.

Information Disclosure Statement

6. The information disclosure statement filed on 11/21/2003 is in compliance with the provisions of 37 CFR 1.97, and has been considered and a copy was enclosed with previous Office Action mailed on 8/29/2006.

35 USC § 101

7.   In view of applicant's amendment to claims 1,8,15, the rejection under

35 USC 101 as set forth in the previous office action is hereby withdrawn.

Interview:

8.   Applicant's Attorney William E. Lewis, Regd.No. 39,274 is thanked for the

telephone interview on 26 January 2007. During that telephone William E. Lewis

granted authorization to amend claims _**1,6-8,13-15,20-21**_ and cancel claims _**3-5,**_

_**10-12,17-19.**_

EXAMINER'S AMENDMENT

9.   An examiner's amendment to the record appears below. Should the changes

and/or additions be unacceptable to applicant, an amendment may be filed as provided

by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be

submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview

with Applicant's Attorney William E. Lewis, Regd.No. 39,274, on 26 January 2007.

The application has been amended as follows:

1. (**Currently Amended**) A method of mining attribute associations in a relational data set, comprising the steps of:

inputting multiple items from the relational data set;

discovering attribute associations using: (i) multi-attribute mining templates formed from at least a portion of the multiple items, wherein each multi-attribute mining template comprises at least one item described by at least two attributes; and (ii) one or more mining preferences specified by a user, wherein the one or more mining preferences specified by the user comprise specification of at least one of: (a) one or more desired multi-attribute mining templates; (b) one or more irrelevant multi-attribute mining templates; and (c) one or more rules concerning values of attributes in the multi-attribute mining templates, further wherein the attribute association discovering step further comprises generating candidate patterns at a template level, wherein candidate patterns of multi-attribute mining templates are derived by merge-joining patterns of nodes of at least a portion of the templates without pre-sorting; and

outputting the discovered attribute associations to at least one of the user and another system;

wherein the multi-attribute mining templates are related by an anti-monotonicity property such that the property holds when mining top-down from k-itemsets to $(k + 1)$-itemsets and when mining items defined by a set of k attributes to items defined by $k + 1$ attributes.

2 through 5. (Canceled).

6. (**Currently Amended**) The method of claim 4 1, wherein the candidate

pattern generating step further comprises maintaining one or more occurrence buffers

to count occurrences of patterns.

7. (**Currently Amended**) The method of claim 4 1, wherein the attribute

association discovering step further comprises pruning candidate patterns at a template

level.

8. (**Currently Amended**) Apparatus for mining attribute associations in a

relational data set, comprising:

a memory; and

at least one processor coupled to the memory and operative to: (i) input multiple

items from the relational data set; (ii) discover attribute associations using: (i) multi-

attribute mining templates formed from at least a portion of the multiple items, wherein

each multi-attribute mining template comprises at least one item described by at least

two attributes; and (ii) one or more mining preferences specified by a user, wherein the

one or more mining preferences specified by the user comprise specification of at least

one of: (a) one or more desired multi-attribute mining templates; (b) one or more

irrelevant multi-attribute mining templates; and (c) one or more rules concerning values

of attributes in the multi-attribute mining templates, further wherein the attribute

association discovering operation further comprises generating candidate patterns at a

template level, wherein candidate patterns of multi-attribute mining templates are derived by merge-joining patterns of nodes of at least a portion of the templates without pre-sorting; and (iii) output the discovered attribute associations to at least one of the user and another system; wherein the multi-attribute mining templates are related by an anti-monotonicity property such that the property holds when mining top-down from k-itemsets to (k + 1)-itemsets and when mining items defined by a set of k attributes to items defined by k + 1 attributes.

9 through 12. (Canceled).

13. **(Currently Amended)** The apparatus of claim ~~11~~ 8, wherein the candidate pattern generating operation further comprises maintaining one or more occurrence buffers to count occurrences of patterns.

14. **(Currently Amended)** The apparatus of claim ~~11~~ 8, wherein the attribute association discovering operation further comprises pruning candidate patterns at a template level.

15. **(Currently Amended)** An article of manufacture for mining attribute associations in a relational data set, comprising a ~~machine~~ computer readable storage medium containing ~~one or more~~ executable programs code which ~~when executed~~ implements the steps of:

inputting multiple items from the relational data set;

discovering attribute associations using: (i) multi-attribute mining templates

formed from at least a portion of the multiple items, wherein each multi-attribute mining

template comprises at least one item described by at least two attributes; and (ii) one or

more mining preferences specified by a user, wherein the one or more mining

preferences specified by the user comprise specification of at least one of: (a) one or

more desired multi-attribute mining templates; (b) one or more irrelevant multi-attribute

mining templates; and (c) one or more rules concerning values of attributes in the multi-

attribute mining templates, further wherein the attribute association discovering step

further comprises generating candidate patterns at a template level, wherein candidate

patterns of multi-attribute mining templates are derived by merge-joining patterns of

nodes of at least a portion of the templates without pre-sorting; and

outputting the discovered attribute associations to at least one of the user and

another system;

wherein the multi-attribute mining templates are related by an anti-monotonicity

property such that the property holds when mining top-down from k-itemsets to (k + 1)-

itemsets and when mining items defined by a set of k attributes to items defined by k + 1

attributes.

16 through 19. (Canceled).

20. (**Currently Amended**) The article of claim ~~18~~ 15, wherein the candidate

pattern generating step further comprises maintaining one or more occurrence buffers

to count occurrences of patterns.

21. (**Currently Amended**) The article of claim ~~18~~ 15, wherein the attribute

association discovering step further comprises pruning candidate patterns at a template

level.

In the Title

Pursuant to MPEP 606.01 the <u>Title</u> is changed to read

--METHOD AND APPARATUS FOR CANDIDATE PATTERNS OF

MULTI-ATTRIBUTE MINING TEMPLATES ARE RELATED BY ANTI-

MONOTONICITY PROPERTY, AND DERIVED BY MERGE-JOINING PATTERNS

OF NODES OF AT LEAST A PORTION OF THE TEMPLATES WITHOUT

PRE-SORTING —

Reasons for allowance

The following is an examiner's statement of reasons for allowance:

The present invention is directed to discovering attribute associations in data, more specifically, attribute associations are discovered using multi-attribute mining templates formed from at least a portion of the multiple items and the multi-attribute mining templates related by an anti-monotonicity property. The candidate pattern of multi-attribute mining templates by merge-joining patterns of nodes of at least a portion of the templates without pre-sorting [see Abstract, page 3, line 12-21].

The closest prior art Garofalakis et al. US Patent 6,473,757 is directed to sequential pattern mining, more specifically, using "pattern mining algorithms" that can exploit user focus by pushing user-specified constraints deep inside the mining process particularly, regular expression is used for identifying the frequent patterns, also generating and pruning candidate patterns during the mining process, [col 2, line 19-24, col 7, line 9-18, fig 1].

The closest prior art Mitsuishi et al. US Patent No. 6,385,608 is directed to discovering association rules, more specifically performing mining data for discovering unknown rules in databases and in calculating algorithm for the data mining. Mitsuishi also teaches discovering an association rule existing between itemsets composed of one or more than one items, from a database storing a plurality of records composed of

one or more than one items, where k is an integer equal to or more than 2 and n

indicates an integer from 1 to k and generating a candidate association rule by using the

large-itemset and testing rule for testing the candidate association rule to be one of

applied and not-applied as the association rule [col 7, line 59-65, col 8, line 22-32,

line 59-65, fig 22-23]

It is however, noted that prior art of record Garofalakis et al. US Patent

6,473,757, Mitsuishi et al. and US Patent No. 6,385,608 either along or in combination

fails to anticipate or render obvious, the recited feature of <u>one or more irrelevant multi-</u>

<u>attribute mining templates; and (c) one or more rules concerning values of attributes in</u>

<u>the multi-attribute mining templates, further wherein the attribute association discovering</u>

<u>operation further comprises generating candidate patterns at a template level, wherein</u>

<u>candidate patterns of multi-attribute mining templates are derived by merge-joining</u>

<u>patterns of nodes of at least a portion of the templates without pre-sorting</u>

in independent claims 1,8,15.

These features, together with the other limitations of the independent claims are

novel and non-obvious over the prior art of record. The dependent claims 6-7,13-14,

20-21 being definite, enabled by the specification, and further limiting to the

independent claim, are also allowable.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance".

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alam, Hosain, T, can be reached on (571) 272-3978. The fax phone numbers for the organization where the application or proceeding is assigned is 571-273-8300 Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free)

sc
Patent Examiner.
January 26, 2007.

SRIRAMA CHANNAVAJJALA
PRIMARY EXAMINER